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| APPLICATION NO.       | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------------|-------------|----------------------|---------------------|------------------|
| 10/537,119            | 06/15/2005  | Susumu Noda          | 123456              | 8366             |
| 25944                 | 7590        | 09/06/2007           | EXAMINER            |                  |
| OLIFF & BERRIDGE, PLC |             |                      | MOONEY, MICHAEL P   |                  |
| P.O. BOX 19928        |             |                      | ART UNIT            | PAPER NUMBER     |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                               |                  |
|------------------------------|-------------------------------|------------------|
| <b>Office Action Summary</b> | Application No.               | Applicant(s)     |
|                              | 10/537,119                    | NODA ET AL.      |
|                              | Examiner<br>Michael P. Mooney | Art Unit<br>2883 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

1) Responsive to communication(s) filed on 15 June 2007.  
 2a) This action is **FINAL**.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

4) Claim(s) 1-12 is/are pending in the application.  
 4a) Of the above claim(s) 13 and 14 is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-11 is/are rejected.  
 7) Claim(s) 12 is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

1) Notice of References Cited (PTO-892)  
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  
 3) Information Disclosure Statement(s) (PTO/SB/08)  
 Paper No(s)/Mail Date 3/13/07, 6/3/05.

4) Interview Summary (PTO-413)  
 Paper No(s)/Mail Date. \_\_\_\_\_.  
 5) Notice of Informal Patent Application  
 6) Other: \_\_\_\_\_.

**DETAILED ACTION**

***Election/Restrictions***

Applicant's election with traverse of claims 1-12 in the reply filed on 6/15/07 is acknowledged. The traversal is on the ground(s) that the refractive index material is not the only common special technical feature since both the method and device claims are directed to a two-dimensional (2D) photonic crystal (PC) slab having a three-dimension (3D) local structure. This is not found persuasive because, as evidenced by the prior art rejection infra, the feature of a 2D PC slab having a 3D local structure is not special since a 2D PC slab having a 3D local structure is not a claimed feature which defines a contribution over the prior art.

It is noted the said method claims require additional searching in a completely different search area. A thorough search has already been done on the elected device claims 1-12, yet it is still very unclear as to whether the non-elected method claims 13-14 contain allowable subject matter or not. It would be irresponsible for the Office to evaluate the said method claims without doing additional (i.e., unduly-burdensome searching) searching beyond what has already been done for the rejection of the device claims infra.

The undue search burden is shown by the fact that other search(es) in different search areas must be formulated and performed in areas well beyond what has already been searched in order for a proper evaluation of the patentably distinct method claims to take place. Furthermore, the said patentably distinct method claims clearly contain

different subject matter than the said device claims that necessitates burdensome searching.

The subject matter of the method and device claims is *not* sufficiently related such that a thorough search of any one Group of claims would encompass a search for the subject matter of the remaining claims.

The requirement is still deemed proper and is therefore made FINAL.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**Claims 1- 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Simon (20030234972).**

Simon teaches (e.g., figs. 1, 7-9) a two-dimensional photonic crystal slab (e.g., 806) having a three-dimensional local structure (e.g., 700), characterized by that it comprises: a) a slab-shaped body 806; b) a plurality of areas (e.g., see the lattice sites in figs. 1, 7-9) having a refractive index different from that of the body (e.g., paragraph 0021), which are periodically arranged in the body (e.g., figs. 1, 7-9, paragraphs 0021-

0022); and c) a refractive index member (e.g., 700, 110) mounted on the surface of the body (e.g., figs. 1, 7-9, paragraphs 0021-0022).

Thus claim 1 is met.

Simon teaches (e.g., figs. 1, 7-9) the two-dimensional photonic crystal slab (e.g., 806) having a three-dimensional local structure (e.g., 700) characterized in that it comprises a waveguide formed by providing a linear defect of the modified refractive index areas in proximity to the refractive index member (e.g., figs. 1, 4, 7-9, paragraphs 0021-0022, 0027). Thus claim 2 is met.

Simon teaches two or more pieces of the refractive index members (e.g., 702, 704) differing in material, shape or size are mounted on the body (e.g., figs. 1, 7-9).

Thus claim 3 is met.

Simon teaches a point-like defect of the modified refractive index areas are provided within the body and a refractive index member is additionally mounted at the position of the point-like defect [e.g., figs. 1, 7-9 and/or paragraph(s) 0034-0037]. Thus claim 4 is met.

Simon teaches a plurality of point-like defects (e.g., paragraph 0021) of the modified refractive index areas having different resonant wavelengths are provided within the body (e.g., figs. 1, 7-9), and a plurality of the refractive index members identical in material, shape and size are arranged on a surface of the body at positions of the point-like defects (e.g., figs. 1,4, 7-9; paragraph 0021). Thus claim 5 is met.

Simon teaches that the refractive index members are mounted on both sides of the body at paragraph 0036 where it is stated that in some embodiments a portion of

section 704 and a portion section 702 are optically communicating with the optical medium. In order for this to occur, a portion of 702 and a portion of 704 must be located in the optical cavity/lattice site. Therefore a portion of 704 must be mounted on one side of the optical medium/body and a portion of 702 must be mounted on the other side of the optical medium/body (see, e.g., fig. 9; paragraph 0036). Thus claim 6 is met.

Simon teaches that the refractive index members are mounted at the same position on both sides of the body (see, e.g., fig. 9; paragraph 0036). Thus claim 7 is met.

Simon teaches that identical refractive index members (702, 704) are mounted at the same position on both sides of the body (e.g., fig. 9; paragraph 0036). It is noted that the refractive index members 702/704 are identical at least in shape (cylindrical) and/or radius. Thus claim 8 is met.

Simon teaches a point-like defect of the modified index areas asymmetrical between front and back sides (e.g., fig. 9). Thus claim 9 is met.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

**Claims 10-11 are rejected under 35 U.S.C. 102(e) as being anticipated by Simon (20030234972).**

Simon teaches (e.g., figs. 1, 7-9) a two-dimensional photonic crystal slab (e.g., 806) having a three-dimensional local structure (e.g., 700), characterized by that it comprises: a) a slab-shaped body 806; b) a plurality of areas (e.g., see the lattice sites in figs. 1, 7-9) having a refractive index different from that of the body (e.g., paragraph 0021), which are periodically arranged in the body (e.g., figs. 1, 7-9, paragraphs 0021-0022); and c) a refractive index member (e.g., 700, 110) mounted on the surface of the body (e.g., figs. 1, 7-9, paragraphs 0021-0022). Thus claim 1 is met.

Although Simon does not expressly use the word "same" in describing the material of refractive index member(s) it would have been obvious to do so because Simon does teach a range of refractive indices that includes the refractive index of a lattice site being the same as that of the surrounding optical medium at, e.g., paragraph 0007 by saying "...at least some of the lattice sites exhibiting refractive indexes that are different than the index of the optical medium...". The aforementioned quote clearly leaves open the possibility that some of the lattice sites may have a refractive index that

is the same as that of the surrounding optical medium. Furthermore, one of ordinary skill would have been motivated to make some of the lattice sites have a refractive index that is the same as that of the surrounding optical medium for the purpose of enabling the production of a wider variety of defect regions that are conventionally known to those of ordinary skill in the art. Thus claim 10 is rejected

Regarding claim 11, it is noted that this claim is worded in such a passive manner that it merely must be shown that the material that Simon and/or one of ordinary skill uses for one of 702 & 704 may have its refractive index modified by an external operation. It is notoriously well known that any refractive index material that would typically be used by one of ordinary skill in the art for 702/704 in Simon figure 9 is able to be changed in refractive index when the said material receives an external operation such as e.g., a temperature change. Thus claim 11 is rejected.

#### ***Allowable Subject Matter***

Claim 12 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art, either alone or in combination, does not disclose or render obvious the refractive index member is a cylinder whose top is concave or convex in combination with the rest of claim 12.

It is noted that the claim 1 is allowable because the unique combination of each and every specific element stated in the claim.

It is further noted that there is no indication in the prior art of utilizing a convex/concave top on the refractive index member for a 2D PC slab having a 3D local structure and the instant Applications PG PUB paragraph 0018 is correct in noting that the idea of controlling the emitting direction and the convergence/spread of light is quite new to conventional types of 2D PC optical resonators.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Background information regarding defects and/or resonant cavities Johnson et al. (6198860) and/or Matsuura et al. (20040213534).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael P. Mooney whose telephone number is 571-272-2422. The examiner can normally be reached during weekdays, M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on 571-272-2415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic

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Business Center (EBC) at 866-217-9197 (toll-free).



Michael P. Mooney  
Examiner  
Art Unit 2883



Frank G. Font  
Supervisory Patent Examiner  
Art Unit 2883

FGF/mpm  
8/30/07